COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

November 10, 2004

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the "record" of the meeting, only a reminder for TMT members. Most presentations were accompanied by Power Point or other electronic information. Please go to the agenda on the TMT web page to see more detailed information.

2004 TMT YEAR END REVIEW

2004 Comparison to Previous Years

- *Water and Runoff Patterns*: Cathy Hlebechuk, COE, presented information on 2004 operations for each of the projects. Of note, a sturgeon pulse operation was implemented at Libby. 12.5 kcfs flat flows were released from late August through the end of September, due to record high rainfall in Montana during late summer. Dworshak operations showed an earlier spill ramp-up this year than in previous years, intended to "get ahead" of fish run timing and higher water temperatures. Grand Coulee experienced very low snow pack runoffs in the spring, and began filling when the March final forecast was released.
    - **LESSONS LEARNED**: As in past years, it was noted that the uncertainty of the water year makes it difficult to balance the river. This fact is demonstrated through the 85% target. How might TMT do a better job operating closer to flood control instead of so much for power? Can we do a better job of balancing fish and power needs? Are language changes to the BiOp needed?
    - **Next Steps**: The BOR will give a presentation to FPAC about how the 85% target is computed at Grand Coulee each year.
- *TDG/Temperature:* Jim Adams, COE, reported on 2004 temperatures and total dissolved gas (TDG) exceedances. This year had the best TDG compliance since 2001. Two new fixed monitoring stations were added this year, at Albeni Falls forebay and tailwater, and Cascade Island (i.e., Bonneville tailwater). Data access is currently available through the CHROMS data base, but the COE is in the process of switching to CWMS. There were 71 days of TDG exceedances – about 2.4% total (so, 97.6% compliance with the standard.) Most exceedances were due to a sharp rise in water temperature, particularly at McNary. Regarding temperature issues, Dworshak releases were as low as 43° F at one point during the season. To our knowledge, this is the lowest targeted temperature at the project. Temperatures at Lower Granite tailwater temperature exceeded 68 degrees only 7 – 10 hours in Water Year 2004.

    - **LESSON LEARNED***:* Dworshak tailwater temperatures were very effective in maintaining Lower Granite tailwater temperature below the state standard a majority of the time. However, they did not appear to impact temperatures downstream at McNary.
    - **Next Steps:** Jim will provide TMT with a report that explains Type 12 exceedance. He also announced that the COE will hold workshops on SYSTDG in March and May.
- *Fish Passage*: Jerry McCann, FPC, reported on 2004 smolt migration: run size, timing, travel time, and survival.
    - Yearling chinook: The run at large showed similar numbers and travel time as compared to historical numbers. Transportation operations this year collected over 50% of the hatchery and wild yearling chinook at Lower Granite. Survival was low this year with in-river at roughly 60%. These numbers are similar to 2001 and could have been due to the lack of spill operations.
    - Steelhead: Population estimates and travel time were similar to previous years, about 5.8 million (5.3 million transported). Transport operations were similar to that of yearling chinook. Survival of hatchery steelhead was high, similar to 2002. Total in-river survival was approximately 40%, which Jerry described as low and similar to recent years.
    - Subyearling chinook: The population index was high (about 1.6 million at Lower Granite). Timing of the run was earlier than historically, ending in late July. This was likely influenced by the supplementation program.
    - **LESSONS LEARNED**: Jerry ended his presentation with a question to the group: Are we overlooking low flow effects by not looking more closely at travel time? We might want to be more aware of travel time impacts when managing the system. From the Fish Passage Center's perspective, low flows and low spill equal slower travel time, which correlates to lower survival.
- *Clues About Relative Survival of Adults*: Jeff Fryer, CRITFC, presented updated information on 2001 outmigrating chinook and sockeye at Bonneville that was first presented at last year's TMT year end review. Generally, 2001 outmigrating summer chinook, sockeye and fall chinook showed particularly low adult returns. The subyearlings appear to be harder hit by 2001 conditions than yearling chinook. Sockeye show the worst numbers than any in the last 6 years. Summer and spring chinook show low returns in the last five years but higher than in the 1980's.
    - **LESSONS LEARNED**: 2001, though bad, was better than pre-1998 returns. After 2005, there will be better information available related to the 2001 drought year.
- *Weather*: Kyle Martin, CRITFC, reported on 2004 weather conditions, summarizing that the early January snow/ice storm caused high precipitation and very low temperatures early in the year, but it was a warm year otherwise. Late summer rains helped put water in the system that would not otherwise have been there. Kyle's winter forecast is as follows: near average November-January temperatures, below average precipitation in November, and near average precipitation in January-March. The likelihood of a snow event in the Portland area is greatest in January (~67%

chance). Kyle shared his review and predictions at the American Meteorology Society's annual meeting at OMSI in October.

- *Adult Fish Runs/Fisheries Review*: *Forecasts and Techniques:* Cindy LeFleur, WDFW, presented information on adult fish runs and fisheries for 2004. The forecasted return of up-river spring chinook was 360,700. Actual observed were 193,800. Summer chinook returns were forecasted at 102,800, while 93,800 were observed. 41,900 angler trips were taken – 1100 summer chinook were harvested, of which 200 went to the commercial harvest – this was the first time since the 1970's that commercial fishers kept any summer chinook. Sockeye were forecasted at 80,700; 124,000 returned. Fall chinook adult returns were forecasted at 634,000; 793,200 were observed. Upriver brights, Mid-Columbia brights, and Bonneville pool hatchery fish all showed greater returns than expected. Cindy explained the forecasting techniques: Total returns divide into stock and age components, forecasts are then done by brood years. She noted that the forecasts are usually accurate, and numbers are under-predicted if anything.

Snake River Review:

- *Snake River Fall Chinook Survival Studies*: Ken Tiffan, USGS, updated the group from last year's year end review on Billy Connor's '98-'03 Fall Chinook survival studies that examined effects of summer flow augmentation on survival (an additional year of data was collected for the study.)
    - **LESSON LEARNED**: Billy Connor's analysis from the studies last year was that lower temperatures and higher velocity are supportive conditions for increasing survival rates of migrating juveniles in the Snake River. This year, remaining questions include: At which reservoirs are the 'reservoir-types' (smaller sizes, older returns) residing? What is their passage timing? What is the abundance? How much turbine mortality occurs during winter passage? How does spill, flow augmentation, etc., influence their prevalence?
    - A concern was raised about missing/undetected fish. How many went through turbines in the winter when de-watered, passed, or went through turbines the following year?
- *EPA Water Temperature Modeling*: Kyle Martin, CRITFC, showed graphs of past and 2004 observed temperatures at the Clearwater River at Peck and Lower Granite. Dave Statler, Nez Perce, offered comments regarding Dworshak operations in 2004:
    - **LESSONS LEARNED**: Attempts to refill as early as possible were an improvement in operations this year; the project filled within 10'.
    - **LESSONS LEARNED**: The water reserved into September which cooled the Snake River was also an improvement this year.
    - **LESSONS LEARNED**: Dave suggested that an area for improvement at Dworshak would be efforts to mimic the spring freshet flows and the natural hydrograph, by operating to the upper flood control rule curve as often as possible and by providing a gentler climb as opposed to the flat, then steep climb in March. It

was noted that there would be TDG exceedance concerns to consider.

2004 Study Information that Might Impact 2005

- *NOAA Survival Studies*: Bill Muir, NOAA, shared information on hydrosystem smolt survival studies from 1993-2004. The study showed that: spring flows were similar to 2001 conditions; in-river survival was the lowest measured since 2001; the vast majority of Snake River smolts were transported; and steelhead mortality was high between McNary and John Day due to tern predation.
    - **LESSONS LEARNED**: Birds appear to be more efficient predators when there are lower flows in the Lower Monumental-John Day reach.
- *Juvenile Collection and Transportation Research Program*: Paul Wagner, NOAA, presented information on behalf of Doug Marsh – a more detailed review was given at the AFEP meeting on November 17th. The study looked at 2004 wild yearling chinook and wild steelhead returns (all of which had been transported) from 2001. NOAA is conducting a monitoring program in 2004, rather than a comparison between in-river and barged fish. Chinook and steelhead transport studies are in progress. Adult returns from previous and in-progress studies are on NOAA's website. NOAA is hoping to have funds to do more research on steelhead, as there is currently very little data.
    - **Next Steps**: NOAA was asked to comment on whether they will make any changes in their management strategy based on the SAR numbers and information collected through the study.
- *Ice Harbor Results: Spring/Summer*: Rudd Turner, COE, reported that there was a bulk vs. flat spill study done at Ice Harbor in the spring and summer of 2004. Results from the spring study show a slightly higher survival percentage for yearling chinook with bulk spill vs. flat spill because passage efficiency was higher with bulk spill. In the summer, there were more similarities between bulk and flat spill with spill efficiency and effectiveness being the same for each. These results likely will impact 2005 operations.
- *Bonneville/Spring Creek:* Rudd also reported on fish passage efficiency for the new corner collector at Bonneville. Fish passage efficiency was 60% with 5 kcfs spill; 51% with the B2 corner collector; and 34% with no spill or corner collector.
- *Montana Resident Fish Study:* Brian Marotz, MTFG, discussed Montana's fish studies: this year modeling, next year biological data. He also discussed Montana's proposed Libby operation as described in the NPCC's Mainstem amendments, and compared it to what actually occurred at Libby in 2004. As described above, a 12.5 kcfs flow was implemented in late August through September. This, from Brian's perspective, was the best operation for Montana's needs seen in 20 years and lead to a very biologically productive year in the reservoir. A concern was raised that this was considered a 'study', with little chance of being able to measure the effectiveness of such a small amount of change to the system. This takes resources away from other research needs. From some perspectives, this is a policy call that needs a policy decision. Brian said he agreed, and that he designed the study in a way that would gather useful information to help with future management.

- **LESSONS LEARNED**: Brian concluded that: minimizing the drawdown at Libby and avoiding a double peak by providing a flat flow can increase overall productivity for resident fish in Montana.

Other Lessons Learned:

- *Impacts of 2001 Operations on Adult Returns*: Russ Kiefer, Idaho, presented information to support the theory that flow and spill are more important than the direct survival estimates might show. He also hypothesized that there is little to no benefit of transport on wild spring/summer chinook, except during low flow years. Russ took studies from various places, compiled them and analyzed them to come up with the conclusions he presented today. His full presentation can be found as a link to today's agenda.
    - **LESSONS LEARNED**:
        - Transportation only benefits wild chinook in low flow years;
        - Dams cause significant latent mortality that flow/spill can reduce;
        - The Victoria Index may be useful as a source for understanding ocean productivity.
        - Direct survival models greatly underestimate the benefits of spill and flow on adult returns.

Facilitation Services Evaluation:

As in past years, Jacqueline Abel will be collecting the annual facilitation services evaluations that were handed out today. The evaluations are due by November 24th (this date has been extended) and are attached to the notes for your convenience. Others that are not official 'members' of the TMT are encouraged to fill the survey out; please note at the top of the form that you are a non-member. TMT members are also welcome to provide feedback to the facilitation team, either directly or through Jacqueline, about ideas for the upcoming process discussion that will be held in December. The facilitation team values your feedback and encourages everyone to take the time to respond thoughtfully and thoroughly to the evaluations. Thank you.

SUMMARY:

- Attempts to refill Dworshak as early as possible were an improvement in operations this year, as well as reserving water for September. A suggested area for improvement is to increase efforts to mimic the spring freshet flows and the natural hydrograph by operating to the upper flood control rule curve as often as possible.
- A more comprehensive monitoring program could provide more answers to important questions about steelhead and late summer migrants. Steelhead are lacking and need more research.
- Operations at Libby proved beneficial to Montana needs this year. Concern was raised that the Montana operation was considered a 'study', and that it may take resources away from other research needs.
- The Victoria Index may be useful as a source for understanding ocean productivity.

Next Meeting, November 24th, 9am-noon:

- Chris Perry (U of ID) presentation on Snake River issues
- Reflections on Lessons Learned from 2004

- Chum update
- Spring Creek Update
- Water Management Plan-Update
- Process meeting schedule

1. Greetings and Introductions.

Today's meeting, the 2004 end-of-season review for the Technical Management Team, was held on November 10 in Portland, Oregon. The meeting was chaired by Cathy Hlebechuk and facilitated by Donna Silverberg. The following is a summary (not a verbatim transcript) of the items discussed at this meeting. Anyone with questions about these notes should contact Hlebechuk at 503/808-3938.

2. 2004 Comparison to Previous Years.

A. Water and Runoff Patterns. Cathy Hlebechuk provided a comparison of the actual flows recorded during the 2004 water management season with actual flows in 2001, 2002 and 2003. She noted that all of this information is available via the TMT website. In 2004, at McNary, the flow objective was 220 Kcfs; the average flow from April 10 to June 30 was 203 Kcfs. During the summer period, from July 1-August 31, the McNary target was 200 Kcfs, while the actual average flow was 134 Kcfs. At Lower Granite, for the spring period (April 3-June 20), the target was 85 Kcfs, while the actual average flow was 70 Kcfs. For the summer period, the Lower Granite objective was 50 Kcfs, and the actual average flow was 33 Kcfs. At Priest Rapids, the target was 135 Kcfs, and the actual average flow was 125 Kcfs. Hlebechuk also provided observed runoff statistics for various basins in 2004, noting that, in general, during the spring period, runoff was 69-85% of normal; for the summer period, observed runoff ranged between 75% and 86% of normal. In other words, she said, 2004 was generally pretty similar to 2003.

Hlebechuk noted that one of the unusual features of the 2004 water year was the fact that, particularly in the Libby basin, late-summer precipitation was extraordinarily high – in fact, some believe that precipitation during August-September 2004 may have been the highest on record.

Moving on to Hungry Horse, Tony Norris said the 2004 operation was benign, with the exception of the late-August period, when enormous volumes of inflow arrived unexpectedly. That's just something we never see at that project at that time of year, he said. That extended into September, and certainly minimized any impacts of the decision to hold Hungry Horse above elevation 3540 on August 31, in order to have some water to release in September. Norris distributed a handout showing Hungry Horse daily operations (inflow, outflow and reservoir elevations) after September 1.

Norris also described Grand Coulee operations in 2004; the most noteworthy aspect of operations at that project in 2004 was Reclamation's failure to achieve Grand Coulee's April 10 flood control elevation. Norris distributed another handout showing Grand Coulee project operations from January 1-April 10; this shows why we missed the

April 10 target, he said, primarily because the drop in basin snowpack during March and April was the second-largest on record in the Columbia River basin. The group devoted a few minutes of discussion to the reasons why the Grand Coulee flood control target was not achieved. Russ Kiefer noted that one difficulty, in operating the system, is that these flood control decisions must be made in the winter, when there is the least amount of certainty about the magnitude of the upcoming runoff volume, but when the demand for water for generating power is at its peak. It's a difficult balancing act every year, he said; however, from the perspective of the salmon managers, it seems that, every year, we use the maximum possible flexibility when it comes to generating power, which often causes the volume for fish to come up short. One question I have is, how can we do a better job in the future, in terms of coming closer to our flood control elevations?

Moving on to 2004 Dworshak operations, Hlebechuk said the project released minimum outflow through January, and did meet its April 10 flood control elevation target. Dworshak reached full pool (elevation 1600) by June 30; the decision was made to release full powerhouse discharge for flow augmentation purposes. In 2004, the action agencies once again received and agreed to implement an SOR requesting that 200 kaf of Dworshak storage be retained for release in September. The actual volume released from Dworshak from September 1-15 was 165 kaf; however, because of high project inflows during August and September, the actual volume delivered during that period was 214 kaf, up slightly from the 206 kaf delivered in 2003. John Wellschlager noted that, in 2004, the decision was made to begin releasing full powerhouse discharge plus a small amount of spill from Dworshak somewhat sooner than has been the case in recent years; the goal of this "front-loading" operation was to get ahead of the water temperature curve at Lower Granite. It appears that the operation was successful in doing so, Wellschlager said. Overall, Dworshak was a success story in 2004, said Hlebechuk – everything worked out very well, in terms of refill, temperature control and flow augmentation.

Moving on to Priest Rapids, Hlebechuk said the 2004 seasonal flow target was 135 Kcfs; actual average flows were 125 Kcfs. At Lower Granite, the flow target for the spring period was 85 Kcfs; actual flows were 70 Kcfs. At McNary, the spring target was 220 Kcfs; actual average flow was 203 Kcfs in 2004. For the summer period, the McNary target flow was 200 Kcfs; actual flows were 134 Kcfs.

B. Temperature/TDG Level Variations. Jim Adams provided an overview of the Corps' water quality monitoring efforts during the 2004 spill season; he touched on the following major topics:

- The Corps operates 29 FMS in the FCRPS; two of these stations – Albeni Falls forebay and Cascade Island below Bonneville – were new in 2004; data from these stations is available via the Corps website
- Days of spill, with start and end dates, at all 10 federal projects
- Comparison of exceedences with previous years – relatively few in 2004, compared to previous years, to be expected given the low water year
- Types of exceedences
- Total exceedences at various projects, 1999-2004
- TDG exceedences at Dworshak in 2004

- Day-average TDG levels at Dworshak, April 1-September 28, 2004
- TDG levels during the Lower Granite outage, September 20-26, 2004
- Decision support SYSTDG – in-season spill management of TDG
- The SYSTDG homepage
- Sample outputs from SYSTDG
- Dworshak summer operations – spill, total outflow, TDG and temperature
- McNary tailwater temperatures through the season, 2004 – somewhat warmer than the average over the last five years

C. Fish Passage. Jerry McCann briefed the TMT on results from the Fish Passage Center's smolt monitoring program for 2004; he noted that his main focus would be on data from the Snake River. He addressed run size, travel timing and survival for these stocks. Among the highlights:

- The relative population indices for Snake River wild, yearling and hatchery spring chinook, 1998-2004 (2004 was the largest year on record, with 12.2 million hatchery releases, about 8 million yearlings and nearly 2 million wild juveniles. A total of 11.8 million chinook smolts were collected at Lower Granite in 2004; 11.25 million were transported)
- Yearling chinook timing at Lower Granite (hatchery and wild combined) – similar to the historic average timing in 2004
- Lower Granite daily yearling chinook passage index vs. flow and spill, April 1-June 30, 2004 (graph), showing a huge daily peak (>700,000) during the first week in May
- Little Goose daily yearling chinook passage index vs. flow and spill, April 1-June 30, 2004
- Lower Monumental daily yearling chinook passage index vs. flow and spill, April 1-June 30, 2004
- Survival of hatchery and wild yearling chinook from Salmon River trap to Lower Monumental, 1999-2004 – survival from the trap to Lower Monumental was relatively low in 2004, on par with survival in 2001
- Water transit time vs. average flow at Little Goose, Lower Monumental and Ice Harbor, 2004 (graph)
- Travel time vs. water transit time, Lower Granite-McNary, 1998-2004 (graph) – 2004 travel time was in the middle of the historic range
- Yearling chinook survival vs water transit time, Lower Granite-McNary, 1998-2004 – about 60% in 2004, again, in the middle of the historic range.
- The relative population indices for Snake River wild and hatchery steelhead, 1998-2004 (2004 Lower Granite hatchery/wild population estimate of 9 million fish, consistent with most recent years; passage index was 5.8 million at lower Granite; 5.3 million were transported)
- Steelhead timing at Lower Granite (hatchery and wild combined) – similar to the historic average timing in 2004
- Lower Granite, Little Goose and Lower Monumental daily steelhead passage index vs. flow and spill, April 1-June 30, 2004 (graphs)
- Survival of hatchery and wild yearling chinook from Snake River and Imnaha traps to Lower Monumental, 1999-2004 – survival from the traps to Lower

Monumental was relatively high in 2004

- In-river steelhead survival vs water transit time, Lower Granite-McNary, 1998-2004 – about 40% in 2004, again, at the low end of the historic range.
- Hatchery/supplementation releases of subyearling fall chinook above Lower Granite, 1995-2004 (2004 numbers the lowest since 2000 due to low egg take at Lyons Ferry hatchery; Lower Granite population index – 1.6 million fish – was relatively high, however).
- Subyearling chinook timing at Lower Granite, 1995-2004 – 2004 timing earlier than other recent years, with the 95% passage point occurring in mid-July.
- Lower Granite daily subyearling chinook passage index vs. flow and spill, April 1-June 30, 2004 (graph).

McCann then offered the following conclusions:

- The population size at Lower Granite is large in the spring
- Operations at Lower Granite and Little Goose maximized transport and made for poorer in-river conditions
- Low 2004 survival for Snake River yearling chinook and steelhead for the Lower Granite-McNary reach
- Timing of the subyearling chinook outmigration was earlier than the historic average due to supplementation.

You mentioned that the poor in-river conditions in 2001 led to lower survival, and laid out some relationships between flow, travel time and the lack of spill, said Dave Statler – are you saying these are the primary drivers that led to the increase in mortality, and the decrease in survival? That was exactly what I was trying to get at, McCann replied – our analyses consistently show that water particle travel time and spill have the two highest correlations to survival in the reaches we're looking at.

D. Clues About Relative Survival of Adults. CRITFC's Jeff Fryer provided a presentation titled "Clues As To the Relative Survival of 2001 Outmigrants As Revealed by the Age Composition of Chinook and Sockeye Salmon at Bonneville Dam." He touched on the following major topics:

- CRITFC samples fish weekly at the adult fish facility on the Washington shore at Bonneville for morphology and fish condition, and to collect scales for aging the fish. The annual target is 500 fish (spring/summer and fall chinook, sockeye and steelhead); normally this target is met or exceeded. The program has been conducted since the mid-1980s.
- High water temperatures (over 72 degrees F) can reduce the frequency of or completely stop sampling during the late summer period, primarily for fall chinook; no sampling occurred between July 24 and September 1 in 2004.
- Over the years, for spring chinook, 75% of the returning adults have been 4-year-old fish; with the remaining 25% divided between 3-year-old and 5-year-old fish.
- Data from the 2001 outmigration
- Returns per adult spawner
- Returns from brood year 1999-origin spring chinook (which outmigrated in

2001): the fifth-highest return since 1984, but the lowest in the past five years, indicating that the 1999 brood year was likely adversely affected by the drought conditions in 2001.

- Summer chinook returns from BY'99: aging not as certain with this stock due to a variety of factors; stock includes both subyearling and yearling outmigrants; adult returns from BY'99 yearlings the fourth-highest on record, but the lowest in the last several years; adult returns from BY'99 subyearlings the third-lowest in 14 years of data. Based on this data, it appears that the drought conditions in 2001 had a greater adverse effect on subyearling summer chinook outmigrants than on yearling summer chinook outmigrants.
- Sockeye returns from BY'99: near the median for the 14 years of adult return data, but the lowest in the last six years. The 2001 outmigrants have returned as adults at a much lower rate than sockeye that outmigrated in 2002.
- Fall chinook returns from BY'99: not as much data on this stock, due to high water temperatures; outmigrate as subyearlings; similar pattern to the BY'99-origin summer chinook outmigrants, with a low rate of adult returns.
- Conclusions: field personnel saw a relatively low rate of adult return for all BY'99-origin (2001 outmigration) stocks, particularly for chinook that outmigrated as subyearlings and for sockeye. For those fish that outmigrated as yearlings, adult return rates from the 2001 and 2002 outmigrations were similar. It appears that subyearling chinook and sockeye were more affected by the poor outmigration conditions in 2001 than were yearling outmigrants. Adult returns from the 2001 outmigration were still better than the years in the mid-1990s. Next year's adult return data will provide a more complete picture of the success of the 2001 and 2002 outmigrations.

E. Weather. Kyle Martin briefed the TMT on weather year 2004, notable for extreme variability in precipitation and temperature patterns. It was a colder than normal year west of the Cascades; a major winter storm brought up to nine inches of snow and freezing rain to western Oregon and Washington. This was followed by an extended dry spell (February-April) that adversely affected snowpacks in many basins. May was warm and wet, but the summer months were extremely hot and dry. A series of strong storms then brought record amounts of precipitation to the region. September was also cool and wet.

Martin said cumulative precipitation at The Dalles in 2004 was 104% of average; percipitation was also above-average in the Okanogan (115% of average), John Day/Umatilla (112%) and Clearwater (111%) basins. Precipitation was below normal in the Snake River Plain (87%), the central Washington/east slopes of the Washington Cascades (96%) and southeast Washington (93%).

Martin then provided a presentation titled "Winter 2004-2005 Climate Forecast." Among the highlights:

- Sunspot number prediction (graph) – on the downward curve of a 12-year cycle

that peaked in 2001
- Sea surface temperature departure forecast
- Multi-variable El Niño index (NEI) – currently low
- Pacific decadal oscillation (PDO)
- UW Climate Impacts Group experimental forecast – Columbia at The Dalles 2005
- NOAA Climate Prediction Center forecast – winter 2004/2005 – significantly warmer and drier than average throughout the Northwest

Martin offered the following month-by-month summary forecast:

- November: near-normal temperatures, below-normal precipitation
- December: near-normal temperatures and precipitation
- January: near-normal temperatures and precipitation
- February: above-normal temperatures, near-normal precipitation
- March: near-normal temperatures and precipitation

He noted that there is a 33% probability of snow in November, 63% in December, 67% in January, 48% in February and 56% in March. He also said that, according to the UW-CIG VIC hydro model, January-July runoff at The Dalles will be 92-94 MAF, 85-87% of normal; the Multi-variable ENSO Index puts it at 98 MAF, 91% of normal.

F. Adult Fish Runs/Fisheries Review: Forecasts and Techniques. Cindy LeFleur provided a presentation titled "Preliminary Review of 2004 Columbia River Fish Runs and Fisheries." She touched on the following major topics:

- Upriver spring chinook returns, 1980-2004 (2004 return: 193,800, compared to a pre-season prediction of 360,700 – still the fourth-largest run since 1980)
- Spring chinook fisheries 2004 – 164,000 angler trips, 23,700 spring chinook kept, commercial harvest of 13,500 fish, SAFE commercial harvest of 10,600 fish; treaty harvest of 17,400 fish
- Columbia River summer chinook returns, 1938-2004 – 2004 return 93,800, just under the predicted 102,800
- Summer chinook fisheries 2004: 41,900 angler trips, 1,100 summer chinook kept, commercial harvest of 200 fish; treaty harvest of 8,700 fish
- Columbia River sockeye returns 1938-2004 – 2004 return of 124,000, half again as large as the forecast 80,700
- Sockeye salmon fisheries 2004 – non-Indian commercial harvest of 700 fish; treaty commercial harvest of 4,700 fish; sport fisheries minor in Columbia River; Lake Wenatchee harvest of 4,700 fish
- Columbia River fall chinook returns 1938-2004 – 2004 return of 792,200, well above the predicted 634,900
- Upriver bright fall chinook returns 1980-2004 – 2004 return 367,700, well above the predicted 287,000, the fourth-highest return since 1980.
- Mid-Columbia bright fall chinook returns – 109,300, compared to a forecast of 88,800, the fourth-highest return since 1980
- Bonneville pool hatchery fall chinook returns 1980-2004 – 2004 return 183,000, the third-highest on record

- Fall chinook fisheries 2004 – 82,500 angler trips, 34,100 chinook kept; commercial harvest of 39,600; treaty harvest of 125,900
- Forecasting techniques
- Forecast accuracy – upriver spring chinook, upriver bright fall chinook, fall chinook (graphs)

3. Snake River Review.

A. EPA Water Temperature Modeling. Martin provided an overview of EPA's water temperature modeling efforts in the Clearwater and Lower Snake Rivers. He put up a series of comparative results – predicted vs. actual – for 2004. Martin noted that, in the Clearwater, the model tracked the major highs and lows remarkably well. The correlation at Lower Granite isn't nearly as good, said Martin; however, overall, this tool appears to be working very well.

Statler said that, with respect to Dworshak operations, in recent years, there have been attempts to refill the project as early as possible, which is good, from a reservoir environment/production standpoint. Also, he said, for the past several years, we have been able to save some water to release in early September – in 2004, for example, we were at elevation 1535 on August 31, and the remaining 15 feet of storage was evacuated during the first two weeks in September – that's another positive thing.

With respect to springtime operations at Dworshak, he said, the closer we can come to mimicking the spring freshet, and the closer we can come to the flood control rule curve, the better. Statler noted that, last winter, there were several short-term increases in Dworshak outflow; that is water that could have been used to keep Dworshak's elevation higher entering the spring refill period, and to mimic the natural hydrograph during the early April period. In the future, he said, that is one area that, in my humble view, could be improved. Wellschlager noted that Dworshak is a multipurpose headwater project; the January spike in Dworshak outflow coincided with the major winter storm event that drove loads upward. The lion's share of the shaping at that project was done to help the outmigration, he said; however, we have to have at least some operational flexibility for power as well. Still, to the degree that we can steadily increase Dworshak outflow during April, while still refilling the project, the better off we'll be, biologically, Statler said.

B. Fall Chinook Survival Studies. Ken Tiffan led this presentation, titled "Investigating Passage of ESA-Listed Juvenile Fall Chinook Salmon at Lower Granite Dam When the Fish Bypass System Is Not Operated." He touched on the following topics:

- Results of analyses on juveniles – ocean-type vs. reservoir-type
- Sample scale pattern analyses – LFH yearling, hatchery subyearling, ocean-type, reservoir-type
- Adult collections 1998-2003 – sampled scales, measured fork length, estimated gender

- Results of analyses on wild adults, hatchery adults (graphs)
- Gender, size and age composition data by juvenile life history type (ocean vs. reservoir) – graphs
- Details on ocean-type juveniles
- Observed rates of seaward movement for wild ocean-type subyearlings PIT-tagged in the Snake River in 2003 (graph)
- What determines life-history type? Passage date at Granite, Goose or Monumental vs. probability of becoming reservoir-type (graph)
- Speculative details on reservoir-type juveniles
- Median fish travel rate (km/d) vs. mean water velocity (graph)
- When do reservoir-type juveniles pass dams? Up to 76% of fish that passed did so before bypass began at Lower Granite
- Juvenile detection histories of adults that were PIT-tagged as juveniles – 60% detected, 40% never detected
- 1996 releases vs. number of detections, by date of passage (graph)
- Observations on releases of PIT-tagged hatchery fall chinook salmon subyearlings -- released 175,443 PIT-tagged fish, 4,932 smolts were transported, 53,324 were bypassed, 3,386 were known to have migrated the following year, 369 adults have returned
- SARs estimated from Lower Granite to Lower Granite – transported: 0.51; bypassed: 0.56; known reservoir-type: 1.35; never detected: ??

Tiffan then offered the following management and research questions:

- Which are the primary reservoirs used by reservoir-type juvenile fall chinook salmon?
- What is the passage timing of juvenile reservoir-type fall chinook salmon in reservoirs?
- How abundant are reservoir-type juvenile fall chinook? Preliminary estimate: 13%-39% for the Snake River, 1998-2003
- How much turbine mortality occurs during winter passage at dams?
- How much does flow augmentation, spill etc. influence the prevalence of reservoir-type juveniles?

Kiefer noted that, during yesterday's flow/survival symposium, some of the ISAB members in attendance had noted that the SARs for yearling fall chinook were higher than the SARs for subyearlings. They jumped to the conclusion that that life history has a survival advantage, he said; what we don't know is the survival of those fish from June of their Age 0 year to April of their yearling year – that's one caution we need to bear in mind when we look at those SAR numbers. The other question is, how many of the undetected fish went through turbines or spill as subyearlings, how many passed the detector dams in the winter, when the facilities are not watered up, and how many passed via spill or turbine passage the following spring? Kiefer said. We know some fish move past the dams during the winter; when you look at PIT-tag collections for yearling fish at any of the dams, we do see a few fish passing early in the season, but not that many. Some time in early April, the numbers increase, as the water warms up. One thing we probably should do is choose a site or sites at which to water up the systems earlier in the year, to give us a better picture of what's happening during the winter months, Kiefer

said. Tiffan replied that, in his view, winter passage appears to be more of a random event, as the fish move around and are attracted by turbine flow, than a purposeful seaward migration.

With the new extended-life batteries, what's your expectation about performance? asked Ron Boyce – will you be able to track the fish throughout the Snake and the Lower Columbia? The minimum tag life is 139 days, so the tags of fish that we release in the next week or so will last into mid-April, Tiffan replied. And your plan is to monitor the entire Snake? Boyce asked. We're monitoring to just below the Ice Harbor tailrace, Tiffan replied.

4. 2004 Study Information that Might Impact 2005 Operations.

A. NOAA Survival Studies. Bill Muir provided a presentation titled "Hydropower System Smolt Survival 1993-2004." Among the highlights:

- Snake River conditions, 2001-2004 – flow by date (graph)
- No spill provided at Lower Granite and Little Goose dams from April 24-May 31; no spill provided at Lower Monumental from May 14-31.
- Transportation was maximized – 91% of non-tagged spring chinook, 97% of non-tagged steelhead
- Hatchery yearling chinook salmon 1993-2004 – survival from release to Lower Granite vs, distance to Lower Granite (graph)
- Estimated yearling chinook (92.3%) and steelhead (86%) survival, Lower Granite to Little Goose, by year
- Estimated yearling chinook (87.5%) and steelhead (82%) survival, by year, Little Goose to Lower Monumental
- Estimated yearling chinook (81.8% and steelhead (51.9%) survival, by year, Lower Monumental to McNary
- Tern predation – 18.4% of all PIT-tagged steelhead leaving Lower Monumental were found on Crescent Island in 2004, up from about 10% in 2002. Tag data from other McNary pool islands is not yet available
- Estimated survival of yearling chinook (80.9%) and steelhead (46.5%), by year, McNary to John Day
- Estimated survival of yearling chinook (73.5%) and steelhead (??), by year, John Day to Bonneville
- Estimated survival of yearling chinook (39.5%) and steelhead (??), by year, Lower Granite to Bonneville
- Per-project extrapolation, chinook and steelhead hydrosystem survival, by year (graph)

Muir then offered the following conclusions:

- Flow during the 2004 migration season in the Snake River was similar to 2001
- In-river survival was the lowest measured since 2001
- However, the vast majority of Snake River smolts were transported
- Steelhead mortality was high between Lower Monumental and John Day dams,

due in part to bird predation.

What is the long-term trend with respect to tern predation at Crescent Island? Martin asked. I'm told it hasn't changed much, in terms of the population of the colony, but it appears that the birds are becoming more efficient, Muir replied. It appears that 2001 was a good training year, in which the birds found that this was a pretty good place to eat.

Should we consider shutting down the corner collector periodically to allow you to collect PIT-tag data at Bonneville? Scott Bettin asked. It would be better for you to finish the corner collector PIT-tag detector, Martin replied. It may not work, said Bettin – if that's the case, we could consider shutting off the corner collector for one or two days a week to give the researchers a chance to collect data. It depends on how important you feel it is to develop an empirical survival estimate for that reach, Muir replied – personally, I don't think it's critical. I would agree that a better option would be to get the corner collector detector up and running, he added.

Paul Wagner then provided a presentation titled "Juvenile Collection and Transportation Research program." He touched on the following topics:

- Snake River studies – 2004 research objectives (transportation vs. in-river migration study
- Wild yearling chinook salmon and wild steelhead studies – Lower Granite
- Results from 2001 outmigration – 16,512 fish transported, 159 returned, SAR 0.96
- 2001 chinook – juvenile tagging and adult return distributions (graph)
- 2001 transportation marking – wild spring/summer chinook salmon trends: SAR by date transported (graph)
- 2001 transportation marking – wild spring/summer chinook salmon age class, conversion rate, travel time (table)
- 2001 transportation marking – wild steelhead: 15,273 fish transported, 357 returned as adults, SAR 2.33
- 2001 steelhead – juvenile tagging and adult return distributions (graph)
- 2001 transportation marking – wild steelhead – trends: SAR by date transported (graph)
- 2001 transportation marking – wild steelhead age class, conversion rate, median travel time (table)
- 2004 juvenile tagging operations, numbers tagged by project, number of fish transported, number migrating in-river (table)
- Snake River transport studies in progress, by stock (table)
- Columbia River studies – 2004 research objectives
- Transport studies – Columbia River 2004 juvenile tagging: number tagged by location, numbers transported, numbers migrating in-river (table)
- Columbia River transport studies in progress (table)

Wagner said that, in general, transport shows a consistent benefit for steelhead; the data is less clear on spring/summer chinook. Do these data suggest that some sort of change in management strategy would be appropriate? Margaret Filardo asked. For steelhead, we're seeing numbers in the 4% range, which is trending toward recovery, said

Wagner; for spring/summer chinook, the numbers we've seen in some recent years have been in the 3% range. There are a couple of caveats; for example, the PIT-tag data tend to underrepresent the run at large, said Wagner. They're good for comparison purposes – groups that are tagged side by side, then given different treatments. However, in terms of predicting the actual returns to the dam, they seem to underestimate that. While we look at the SARs, 1.5% is as good as we've gotten; however, that isn't necessarily what we're seeing in terms of the run at large, Wagner said.

B. Ice Harbor Results: Spring/Summer. Rudd Turner provided preliminary data summaries for the study of passage behavior and survival of radio-tagged subyearling chinook at Ice Harbor Dam in the spring and summer periods of 2004 (4-day block design of bulk vs. flat spill):

- Average project and spillway operations, June 26-July 31 (table)
- Preliminary results of 2004 passage behavior and survival study for radio-tagged subyearling chinook at Ice Harbor – median forebay residence time, median tailrace egress time, spill efficiency, spill effectiveness, FPE, spillway survival, dam survival under bulk spill vs. flat spill conditions (table) – dam survival 88.3% under bulk spill vs. 86.4% under flat spill
- Average project and spillway operations, May 1-June 6, 2004
- Preliminary results of 2004 passage behavior and survival study for radio-tagged subyearling chinook at Ice Harbor – median forebay residence time, median tailrace egress time, spill efficiency, spill effectiveness, FPE, spillway survival, dam survival under bulk spill vs. flat spill conditions (table) – dam survival 93% under bulk spill vs. 90% under flat spill.

Turner noted the Ice Harbor RSW, currently under construction, will be delivered to the project in February; in March, the Corps will begin doing balloon-tag evaluations to look at fish entry and survival through the new structure. There will be some sort of Ice Harbor spill test in the spring of 2005, although the details have yet to be decided; the overall goal will be to evaluate biological performance with the RSW in place against previous performace.3

C. Bonneville/Spring Creek. Turner also provided an abstract from a paper titled "Hydroacoustic Evaluation of juvenile Salmonid Fish Passage at Bonneville Dam." They also provided tables showing preliminary corner collector efficiency, Powerhouse 2 FPE, passage route, project FPE and spillway efficiency for yearling chinook, steelhead and subyearling chinook. In addition, the Corps provided an "executive summary" table showing the survival of radio-tagged yearling chinook and steelhead through a minimum-gap runner turbine and the ice and trash sluiceway at PH1. All of these documents and tables can be viewed online and downloaded via hotlinks on today's agenda on the TMT homepage. Overall, said Turner, the corner collector seems to be working well.

D. Montana Resident Fish Study. Brian Marotz provided a presentation titled "Monitoring the Effects of NPPC Mainstem Amendments on Resident Fish in Montana." Marotz noted that the funding for this project was only recently approved by the Council; fieldwork is scheduled to begin soon on the Flathead and Kootenai, but for 2004, only

modeling results are available. In the course of his presentation, Marotz touched on the following major topics:

- Libby reservoir elevation, by month, under the old and new NOAA Fisheries BiOp and IRC/VARQ operations (graph)
- Alternative 1 – flat flow at 12.5 Kcfs through August 31 – flow vs. elevation at Libby (graph)
- Alternative 2 – steady decreasing flows – flow vs. elevation at Libby
- Alternative 3 – steady decreasing flows – flow vs. elevation at Libby
- Alternative 4 – flat flow at 10 Kcfs – flow vs. elevation at Libby
- Alternative 5 – double peak operation – flow vs. elevation at Libby
- Primary production in Libby reservoir, by alternative – highest under Alternative 4
- Zooplankton production in Libby reservoir, by alternative – highest under Alternative 4
- Benthic production in Libby reservoir, by alternative – highest under Alternative 3
- Kokanee growth in Libby reservoir, by alternative – highest under Alternative 4
- Mean flow over time, pre- and post-impoundment (graph)
- White sturgeon tiered flows – discharge over time (graph)
- Natural inflow over time (graph)
- Dam discharge under the current operating regime vs. IRC/VARQ operations (graph)
- Daily discharge variability before and after impoundment (graphs)
- Discharge alternatives 1-5 – Libby Dam outflows, April-September (graph)
- Kootenai River benthic biomass units, March-September, by alternative (highest under Alternative 1).

One thing that puzzles me is that this amendment has been characterized as a study, said Kiefer. It states in the hypothesis that you expect to see a significant increase in the productivity of the Montana reservoirs as a result of this change in operations, in exchange for an unmeasurable impact to anadromous fish. Yet in this presentation, you're saying you expect to see a 1.2% increase in phytoplankton production, Kiefer said. My concern isn't so much with the proposed operation – my concern is that it is being couched as a study. I am confident that we will not be able to measure a biological difference either for bull trout or for salmon as a result of this operation, Kiefer said – we have a lot of other high-priority needs that aren't being filled, and this "study" takes resources away from that other work. I don't see that you're even going to be able to measure a 1.2% increase in phytoplankton production, let alone the effects of that increase on bull trout production.

That was the first thing I said when I was told we were going to be doing this, Marotz replied – I asked "why?" What I decided to do, for that reason, is to not dodge that bullet, he said – I've been talking about this stuff for 20 years. You ask what this will mean for fish – well, my fish live between or above dams. They don't go through counting facilities, so you're right – it is going to be extremely tough to measure increases in bull trout production. My feeling was, all right, if everybody wants this done, we're going to do it, but I'm going to design this project so that it yields not only that

information, but other information we need for management purposes – it's not going to be a throwaway project, by any means.

5. ***Other Lessons Learned***.

A. Impacts of 2001 Operations On Adult Returns. Russ Kiefer led this presentation, titled "Impacts of 2001 Migration Conditions on Adult Returns – Evidence that Flow and Spill Are More Important Than Direct Survival Estimates Indicate." Among the highlights:

- T/C for wild spring/summer chinook, by migration year (graph)
- D value for wild spring/summer chinook, by migration year (graph)
- Little to no benefit of transport to wild spring/summer chinook except in low-flow years
- The relative SAR of migration year 2001 in-river smolts declined by about four-fold compared to the MY1994-2002 average
- The most plausible explanation is that increased migration delay, turbine passage and bypass passage caused a dramatic increase in mortality for in-river smolts
- SAR impacts of MY2001 conditions on in-river smolts were approximately four times greater than direct survival estimates indicate
- Yakima River and Snake River wild chinook SARs, 1982-2002 (graph)
- Yakima River wild chinook SARs and ocean productivity (the "Victoria Index"), MY1984-2001 (graph)
- The 2001 smolt migration faced poor flows but good ocean conditions; the state, tribal and USFWS modelers all predicted poor to mediocre adult returns
- Predicted S:S vs. water particle travel time (graph)
- Snake River fall chinook adult returns, 1996-2003 (graph)
- What do the adults tell us? First, that transportation only provides a benefit to wild chinook in low-flow years; second, that dams cause significant latent mortality that flow and spill reduce; third, that the Victoria Index may be useful in predicting ocean productivity, and fourth, that direct survival estimates greatly underestimate the benefits of flow and spill on adult return rates

What would you do differently during a drought year? Bettin asked. Kiefer relied that, at a previous TMT meeting, Jim Litchfield had argued that, with respect to the importance of flow and spill for fish, the fish that went out under some of the worst migratory conditions on record in 2001 seemed to experience no detrimental impacts, in terms of the adult returns from that outmigration year. I'm not trying to say we should operate the system differently during a drought year, Kiefer said; my point is that there was a big biological impact associated with 2001 outmigration conditions. Flow and spill are more important than the direct survival estimates would indicate.

With that, today's meeting was adjourned. Meeting summary prepared by Jeff Kuechle, BPA contractor